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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Industrial Application]** This invention moves on a screen the pointer displayed on the screen of the display unit which is applied to a pointing device, especially is used for a computer, and a desired line, a desired graphic form, etc. are generated, or it relates to the pointing device for specifying the specific region on a display screen and performing a predetermined instruction.

**[0002]**

**[Description of the Prior Art]** Conventionally, various pointing devices are used with the keyboard as an input device of a computer. A pointing device is an input unit indispensable when the input from a keyboard cannot be performed like [ in the case of a motion of a hand and a wrist performing the instruction and entry of data to a computer to the input from the keyboard of the alphabetic character base, and creating especially graphic data ].

**[0003]** It is used in order to choose with a mouse the icon currently displayed on the screen of a display unit, without inputting from a keyboard the instruction inputted into a computer and to perform a predetermined program by this, except when there is a mouse and it deals with a graphic form etc. as a typical pointing device recently.

**[0004]** In order to raise operability, this pointing device is formed so that various amelioration may be added, for example, the height of the body section of a mouse can be adjusted to JP,3-55622,A, and is aiming at improvement in operability by this.

**[0005]** Moreover, what is indicated by JP,4-65710,A establishes the driving means for changing the sense into the display unit of a computer, and prepares the carbon button which sends the command for changing the sense of a display unit into the driving means to a mouse, makes in agreement a motion of a mouse and a motion of the cursor displayed on the screen of a display unit, and operability is made to improve. Furthermore, the technique the migration length from the zero set as arbitration divides in X and the direction of Y, and enabled it to display on a mouse is indicated by JP,2-18610,A.

**[0006]** Furthermore, the input unit which attached the actuation object with which the actuation switch is formed in JP,63-27938,U to the hold object which has held the rotation detection means of a ball and this ball possible [ an angular displacement ] is indicated. The thing of a trackball mold which operates it by rotating a ball with a finger as indicated by the others, for example, JP,61-79923,A, and JP,3-100938,U of such a mouse mold is also invented. [ pointing device ]

**[0007]**

**[Problem(s) to be Solved by the Invention]** Although it could say that the conventional pointing device which was mentioned above moving to a position the cursor or pointer displayed on the screen of a display unit, or specifying the predetermined field on a screen, and performing a program was equipped with sufficient function, when it plotted or a picture was drawn, there was un-arranging [ that operability was bad ].

**[0008]** That is, with the pointing device of a mouse mold, the mouse is moved in rotation of the overarm section from which the shoulder joint serves as a shaft, rotation in which an elbow joint serves as a shaft,

and revolution-of-the-hand actuation. However, a locus must be delicately controlled by the activity of a plot etc. and the fine motion with a motion, and the index finger and the thumb of a wrist cannot be used like [ in the case of drawing with a pen or a pencil ] with a mouse according to it. For this reason, in the above-mentioned conventional example, the activity which performs a fine plot and fine drawing became difficult.

[0009] Moreover, in the pointing device of the trackball mold which is made to rotate a ball and is operated with the finger mentioned above, by motion of a fingertip, although the fine motion was possible, if it was when the continuous long line etc. was plotted, there was un-arranging [ that operability was bad ] from there being little the cursor on the display screen which moves by one migration of a finger or the migration length of a pointer.

[0010] Furthermore, also out of a pointing device which was mentioned above, it is a thing imitating actuation of writing implements, such as the conventional pen and a pencil, and the thing of a format which uses and inputs the pointing device of a pen mold on a tablet is also. However, the work flow's having broken off and having un-arranged [ that working efficiency falls ], when keyboard entry and the input by the pointing device of a pen mold were repeated by turns, since this pen type of thing needed the actuation which has the pointing device of a pen mold in a hand, and establishes it whenever it can input it only on a tablet and inputs it.

[0011]

[Objects of the Invention] It sets it as the purpose to offer the pointing device which performs a big motion quickly like the usual mouse while being able to control a fine motion by the fingertip, when improving un-[ in which this conventional example has this invention ] arranging and performing plot and drawing especially on the display screen of a computer and which can perform an input efficiently, without a work flow breaking off even if it can carry out things and moreover inputs a keyboard and by turns.

[0012]

[Means for Solving the Problem] The ball which was exposed in part caudad and was supported free [ rotation ] from the base in invention according to claim 1, While having a housing having a rotation detection means to divide and output the signal corresponding to the rotation of this ball to the component of two directions, and the actuation switch which outputs an actuation signal and constituting this housing from an up housing and a lower housing In the pointing device which the top face of an up housing is equipped with the manual operation button connected with the actuation switch, and grows into it The configuration of arranging the manual operation button which formed and mentioned above the crevice of the configuration which a part of peripheral surface which stands in a row in a part of the top face and this cut and lacked in the up housing to the crevice on an up housing is taken.

[0013] In invention according to claim 2, the up housing has taken the configuration of having one crevice mentioned above.

[0014] In invention according to claim 3, the up housing has taken the configuration of forming a septum between these two crevices while being equipped with two crevices mentioned above.

[0015] While a disc-like member constitutes a lower housing from invention according to claim 4 in the pointing device of the claim 1 above-mentioned publication Prepare the hole which supports the ball mentioned above in the center of a base of this lower housing, and the center section of the lower housing concerned is set as the condition of having dented inside from the periphery section. By supporting a ball lower limit in the condition of having estranged from the installation side of a lower housing, and pushing the top face of an up housing caudad, the up housing carried out elastic deformation and the ball has taken the configuration of making it contact an installation side.

[0016] In invention according to claim 5, the housing mentioned above has taken the configuration that a lower housing connects the perimeter of the same center line as possible in adjustment of angle of rotation within the limits of a predetermined include angle, maintaining an engagement condition with an up housing. It is going to attain the purpose mentioned above by this.

[0017]

[Function] The pointing device of this invention is used for a level installation side, placing like the

usual mouse, and an operator inserts a finger and it is made for the inside of the inserted finger to meet a manual operation button in the crevice established in the housing. In this condition, the sense of the housing of a pointing device is decided with the finger inserted in the crevice. And the ball at the base of a housing will rotate by friction with an installation side, if it moves inserting a finger in the crevice of the housing of a pointing device, like the usual mouse, with a rotation detection means, the rotation and hand of cut of a ball are detected, the signal will be inputted towards a computer, and will be displayed on the scope of a computer, and the location of cursor or a pointer will move it corresponding to migration of a pointing device.

[0018] Moreover, the cursor or pointer displayed on a scope can be delicately moved by moving finely an operator's finger inserted in the crevice of the housing of a pointing device.

[0019] If a manual operation button is pushed inserting a finger in this crevice, the actuation switch built in the pointing device will be operated, and an actuation signal will be outputted to a computer. And since it is small and a housing can be made light when one crevice is established in the housing of a pointing device, delicate actuation is attained by the motion of one finger.

[0020] Two crevices are adjacently formed in the housing of a pointing device. Moreover, between these two crevices When the septum for lifting a housing with the finger inserted between the two crevices concerned is formed Actuation is possible with the same feeling as the mouse equipped with two usual manual operation buttons, and also with two fingers inserted in this crevice, the septum concerned can be lifted and it can move to the location of the request of a pointing device on an installation side.

[0021] About what it is formed where the base of a housing is dented from a center, and the ball lower limit is estranging and supporting from the installation side of a housing Only by having only inserted the finger in the crevice of a housing and moving a pointing device to it, a motion of a pointing device It is not reflected in a motion of the cursor or pointer displayed on the scope, but where a housing is pushed against an installation side with a finger, only when it moves, cursor or a pointer moves on a scope.

[0022] Furthermore, when the housing consists of an up housing with which the crevice mentioned above and the manual operation button were prepared, and a lower housing connected possible [ include-angle adjustment ] within the limits of 90 degrees as opposed to this up housing, the actuation direction of a finger can be changed to the cursor on a scope, or the migration direction of a pointer.

[0023]

[Example] Hereafter, one example of this invention is explained based on drawing 1 thru/or drawing 2.

[0024] Drawing 1 is the perspective view showing the appearance of the pointing device in this example, and drawing 2 is the decomposition perspective view. As shown in this drawing 1 and drawing 2, the housing of a pointing device consists of lower housings 2 of the disk mold which constitutes the up housing 1 of a cylindrical shape, and a base from cross-section inverted-L-shaped. The crevice 8 for holding the finger of the configuration which a part of that top face and peripheral surface cut and lacked is formed in the up housing 1, and the pars basilaris ossis occipitalis of this crevice 8 is equipped with manual operation buttons 3 and 4.

[0025] These manual operation buttons 3 and 4 are being interlocked with the switch which is not shown in each drawing 2 prepared caudad respectively, and by depressing a manual operation button 3 or a manual operation button 4 with a finger, they are constituted so that it may be outputted to the computer which an actuation signal does not illustrate. Moreover, the crevice 8 mentioned above is formed in the configuration which the profile of one fingertip suits, it is the location which put in the fingertip in the crevice 8, and the inside of a finger is located in the top face of each manual operation buttons 3 and 4.

[0026] In this example, the up housing 1 and the lower housing 2 which constitute the housing of a pointing device are below 35 [mm] more than the diameter 20 [mm], are formed in the magnitude below height 25 [mm], and have become an operational configuration with one finger. Here, a crevice 8 is made into the profile configuration which puts two fingertips in order and can hold them, and when it holds two fingers in a crevice 8, it may be constituted so that the inside of each finger may be located in the top face of each manual operation button.

[0027] Moreover, the lower housing 2 is formed with the disk in which elastic deformation is possible.



The engagement protruding line 7 for stopping on the inner circumference edge of the lower limit of the up housing 1 which mentioned the lower housing 2 concerned above is annularly formed in the location by the core side from the top-face periphery section of the lower housing 2. Moreover, the ball 5 is arranged in the center of the lower housing 2, and this ball 5 is supported by the periphery section of the hole 6 formed in the center of the lower housing 2. And the part by the side of the lower limit of this ball 5 is in the condition of having been exposed caudad from the lower housing 2.

[0028] The roller which is being fixed to shaft 9A and shaft 10A and which is not illustrated touches the ball 5, and rotation of a ball 5 is transmitted to shaft 9A and shaft 10A through this roller. This shaft 9A and shaft 10A are supported free [ rotation ] to the lower housing 2 in the direction (X shaft orientations, Y shaft orientations) which intersected perpendicularly mutually. The slit disks 9 and 10 are formed in each shafts 9A and 10A, and each rotation of the slit disks 9 and 10 is detected by the X-axis slit sensor 16 currently fixed to the lower housing 2 side, and the Y-axis slit sensor 17.

[0029] The circuit block diagram of the signal-processing system of the pointing device mentioned above in drawing 3 is shown. In this drawing 3, the left switch 13 and the right switch 14 as an actuation switch are a switch formed respectively corresponding to the lower part of a manual operation button 3 and a manual operation button 4, and the signal corresponding to actuation of each manual operation buttons 3 and 4 is inputted into a signal / coordinate transformation circuit 21 from said each switches 13 and 14. Moreover, the signal generated by the X-axis slit sensor 16 and the Y-axis slit sensor 17, i.e., the signal corresponding to rotation of a ball 5, is inputted into this signal / coordinate transformation circuit 21.

[0030] In a signal / coordinate transformation circuit 21, the signal inputted from each slit sensors 16 and 17 is changed into the integral multiple of distance and a coordinate unit, and it changes into a coordinate specification signal in response to the input signal (switch-on signal) from each switches 13 and 14. The signal outputted is sent to a computer through the parallel/serial-conversion circuit 22, and the cable / wireless conversion circuit 23 from a signal / coordinate transformation circuit 21. This parallel/serial-conversion circuit 22 is unnecessary when sending out a signal to juxtaposition at a computer. Moreover, when transmitting the output signal of a pointing device to a computer on radio, it is required, and the cable / wireless conversion circuit 23 is unnecessary when sending out a signal to a computer with a cable.

[0031] Here, the left switch 13 and two right switches 14 may not be formed as an independent switch, but the switch of one seesaw mold may be used. Moreover, the manual operation buttons 3 and 4 prepared corresponding to each switches 13 and 14 may also be formed in the seesaw mold tilted to right and left centering on a center section, and may be constituted as a detail part.

[0032] The outline sectional view in the condition of having laid the pointing device of this example in drawing 4 to the installation sides 20, such as a desk, is shown. It is in the condition that the force is not applied to the lower housing 2 at this drawing 4 at a case, and that periphery section has become a location lower than the part of the hole 6 which is supporting the ball 5 as shown in the drawing 4 concerned. In this condition, even if the lower limit of a ball 5 does not contact to the installation side 20 but it moves a pointing device, a ball 5 does not produce rotation. Moreover, drawing 5 shows the condition of having put the finger on the crevice 8 of the up housing 1, and having pushed the housing against the installation side 20 lightly. In this condition, the periphery section of the lower housing 2 is pushed by the installation side, elastic deformation of the lower housing 2 is carried out, that base becomes Taira and others, the location of a hole 6 descends and the ball 5 is in the condition of having contacted to the installation side 7. If a pointing device is moved in this condition, by friction with the installation side 20, a ball 5 will rotate and rotation of the ball 5 concerned will be transmitted to shaft 9A and shaft 10A through the roller which is not illustrated. Rotation of each shafts 9A and 10A is transmitted to the slit disks 9 and 10, and each rotation is decomposed into the X-axis and Y shaft orientations by the slit sensors 16 and 17, and it is outputted to a computer side.

[0033] Other examples of a pointing device are shown in drawing 6. In the example shown in this drawing 6, the crevice 8 for finger hold currently formed in the up housing 1 is divided into left crevice 8A and right crevice 8B by the septum 11 formed in that center. Other configurations are the same as

that of the example mentioned above. This left crevice 8A and right crevice 8B are formed in the profile configuration which can hold one fingertip at a time, respectively, and the manual operation button 3 and the manual operation button 4 are formed in the base of each crevice, respectively.

[0034] In the example shown in this drawing 6, a pointing device can be picked up by putting a septum 11 between two fingers, and when moving greatly the cursor or pointer currently displayed on the scope of a computer, and the installation side in which the pointing device is laid is narrow and the pointing device has made it move to the corner of an installation side, a pointing device is lifted from an installation side and it can replace in the center of an installation side.

[0035] The example of further others of a pointing device is shown in drawing 7. Also in the example shown in this drawing 7, although there is no exceptional difference in the example mentioned above and structure, in this example, the lower housing 2 has become rotatable within the limits of 90 abbreviation to the up housing 1, and include-angle adjustment can be performed within the limits of this include angle.

[0036] The marks 12A and 12B for displaying a mutual home position are displayed on the up case 1 and the lower case 2.

[0037] By being supported, after it was formed in each above-mentioned example here with the disc-like lower case 2 with which the whole center section of the base of a housing was dented from the periphery section and the ball lower limit has estranged from the installation side of a housing, and pushing the top face of a housing caudad The lower case 2 carries out elastic deformation, and although illustrated about the case where it is constituted so that a ball 5 may contact an installation side, a housing base may constitute a ball as a flat side so that a floor line may be contacted from the beginning.

[0038] Moreover, in each example mentioned above, although two manual operation buttons are prepared, the mode thing which prepared only one manual operation button can also be carried out. In this case, in what has established the crevices 8A and 8B in which the actuation switch formed corresponding to a manual operation button is also set to one, and a finger is held in two cases, a manual operation button may be arranged at the pars basilaris ossis occipitalis of one of crevice 8A, or 8B.

[0039]

[Effect of the Invention] As mentioned above, since it moves to the crevice established in the housing by inserting a finger according to the pointing device of this invention, the sense of a pointing device can be decided by the sense of a fingertip, and delicate actuation of a fingertip can be made to reflect in a motion of the cursor or pointer displayed on the display of a computer, therefore the input by a mouse etc. can perform the plot and drawing on the difficult display screen easily by fine motion of a fingertip conventionally.

[0040] Moreover, when moving cursor and a pointer greatly on a screen, a pointing device can be greatly moved like the usual mouse by actuation of the joint of a shoulder or an elbow. Moreover, a crevice for an operator to hold a finger is the configuration which a part of top face of a housing and peripheral surface cut and lacked, and it can continue an input efficiently, without a work flow breaking off, even if it inputs a keyboard and by turns since the manual operation button is arranged at the pars basilaris ossis occipitalis of a crevice.

[0041] Furthermore, when the pointing device equips the housing with one crevice of the configuration which suited the profile of a fingertip, a pointing device can be formed in a compact and can be easily operated only by one fingertip.

[0042] moreover, when the crevice of the configuration which suited the profile of a fingertip adjoins the housing of a pointing device, and two are formed and the septum for lifting a housing with the finger inserted between two crevices is formed between the two crevices concerned Actuation is possible with the same feeling as the mouse equipped with two usual manual operation buttons, and also a septum can be lifted with two fingers inserted in this crevice, and a pointing device can be moved to the location of the request on an installation side. This sake, In case the cursor or pointer currently displayed on the display screen of a computer is moved greatly When the installation side in which the pointing device is laid is narrow and the pointing device has made it move to the corner of an installation side, there is an advantage that the whole pointing device is lifted from an installation side, and it can replace in the

center of an installation side.

[0043] furthermore, when it is constituted so that a ball lower limit may contact an installation side, only when it pushes against an installation side, the case of a pointing device If it is not made to move, only inserting a finger in the crevice of a housing and pushing a pointing device against an installation side Since a motion of a pointing device is not reflected in a motion of the cursor or pointer displayed on the scope When operating the keyboard etc., even if a hand touches a pointing device, the location of the cursor currently displayed on the scope or a pointer does not move.

[0044] moreover, when the housing of a pointing device consists of lower housings connected possible [ include-angle adjustment ] within the limits of 90 abbreviation to the up housing with which the crevice and the manual operation button were prepared, and this up housing The actuation direction of a finger can be changed to the cursor on a scope, or the migration direction of a pointer, and the outstanding pointing device which is not in the former that it can adjust so that the optimal operability may be acquired according to the sense of a display can be offered.

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## EFFECT OF THE INVENTION

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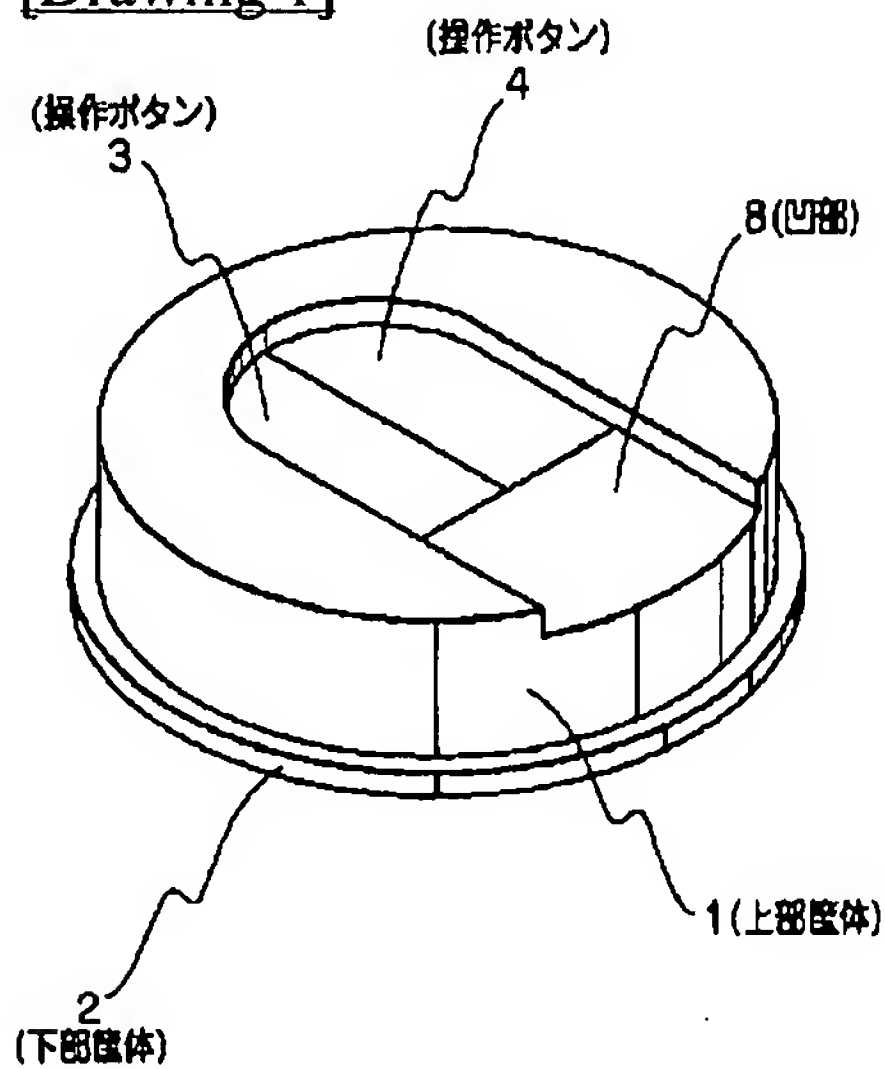
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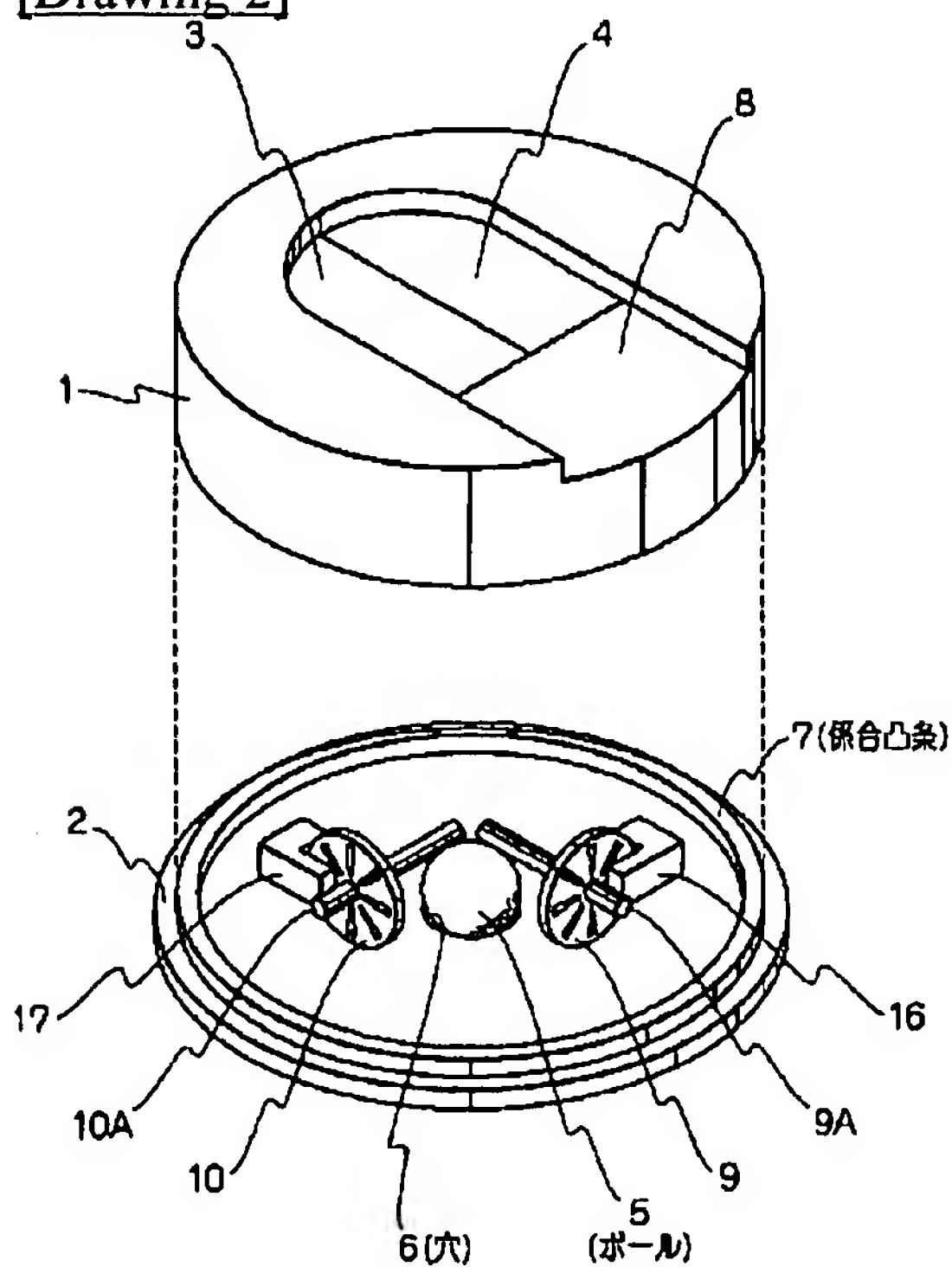
DRAWINGS

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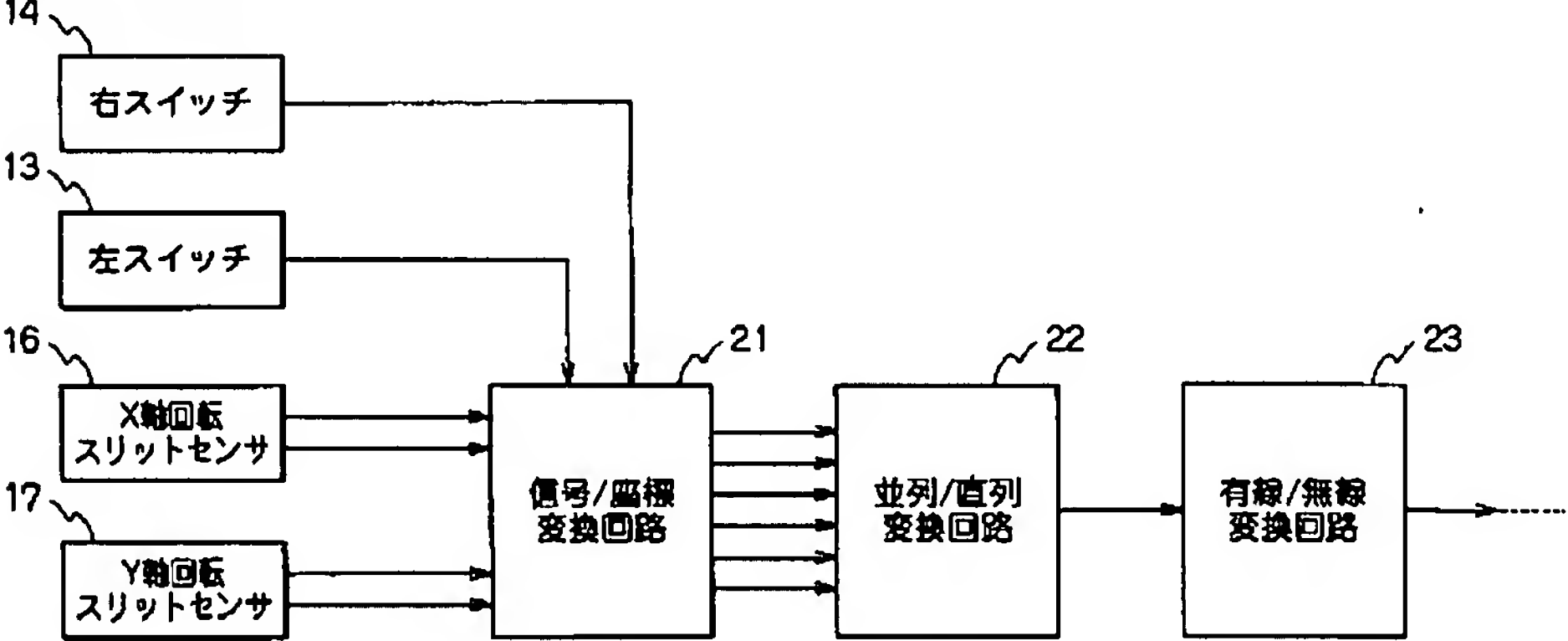
[Drawing 1]



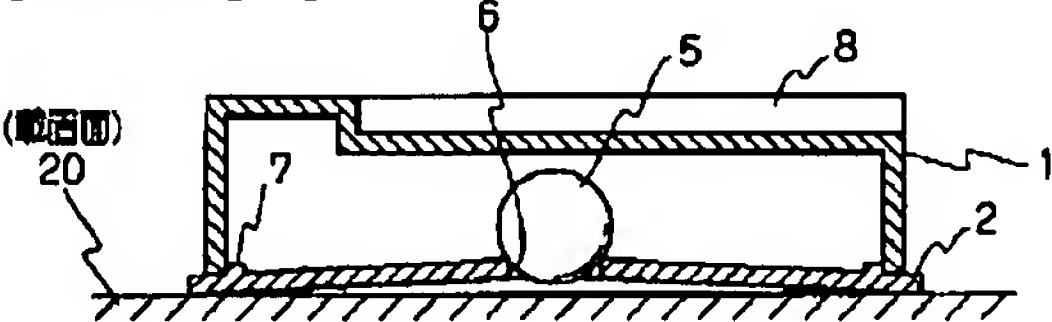
[Drawing 2]



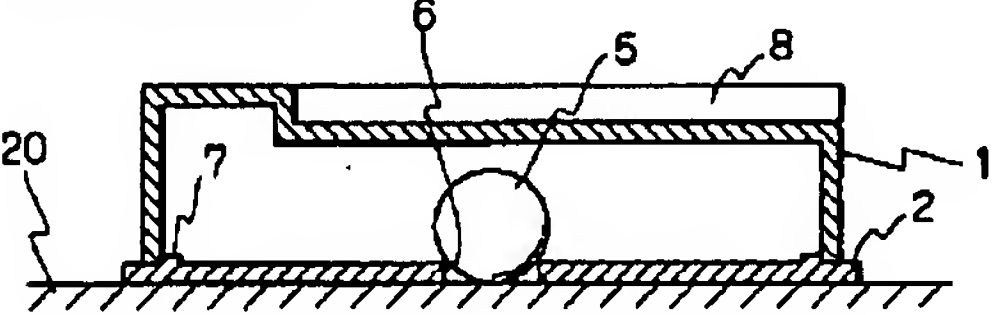
[Drawing 3]



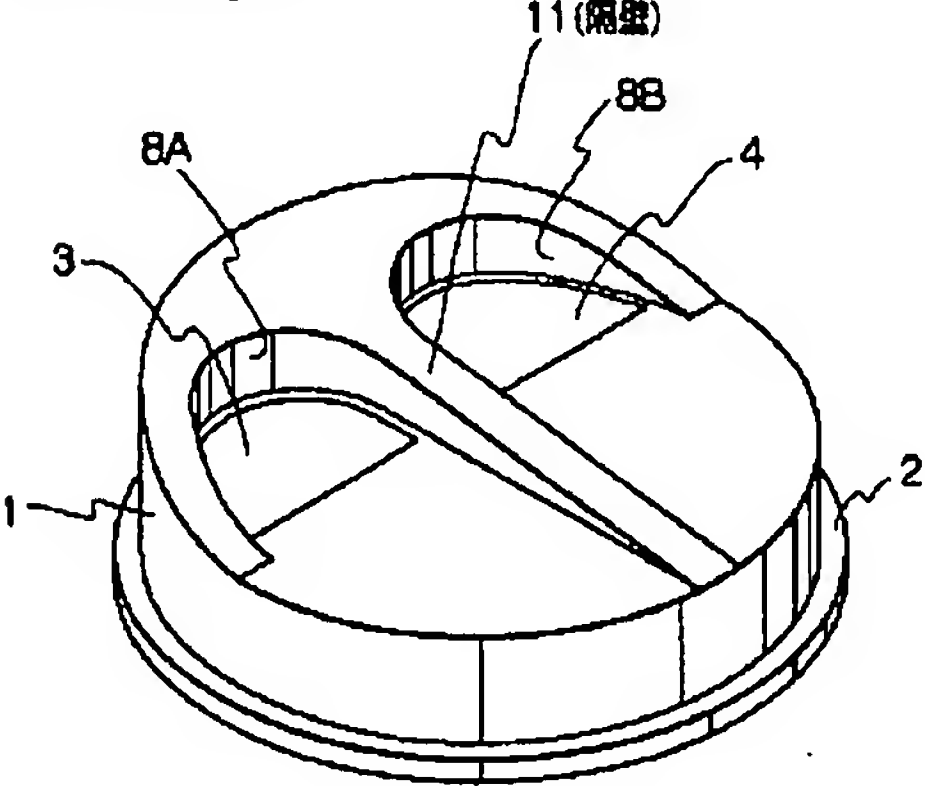
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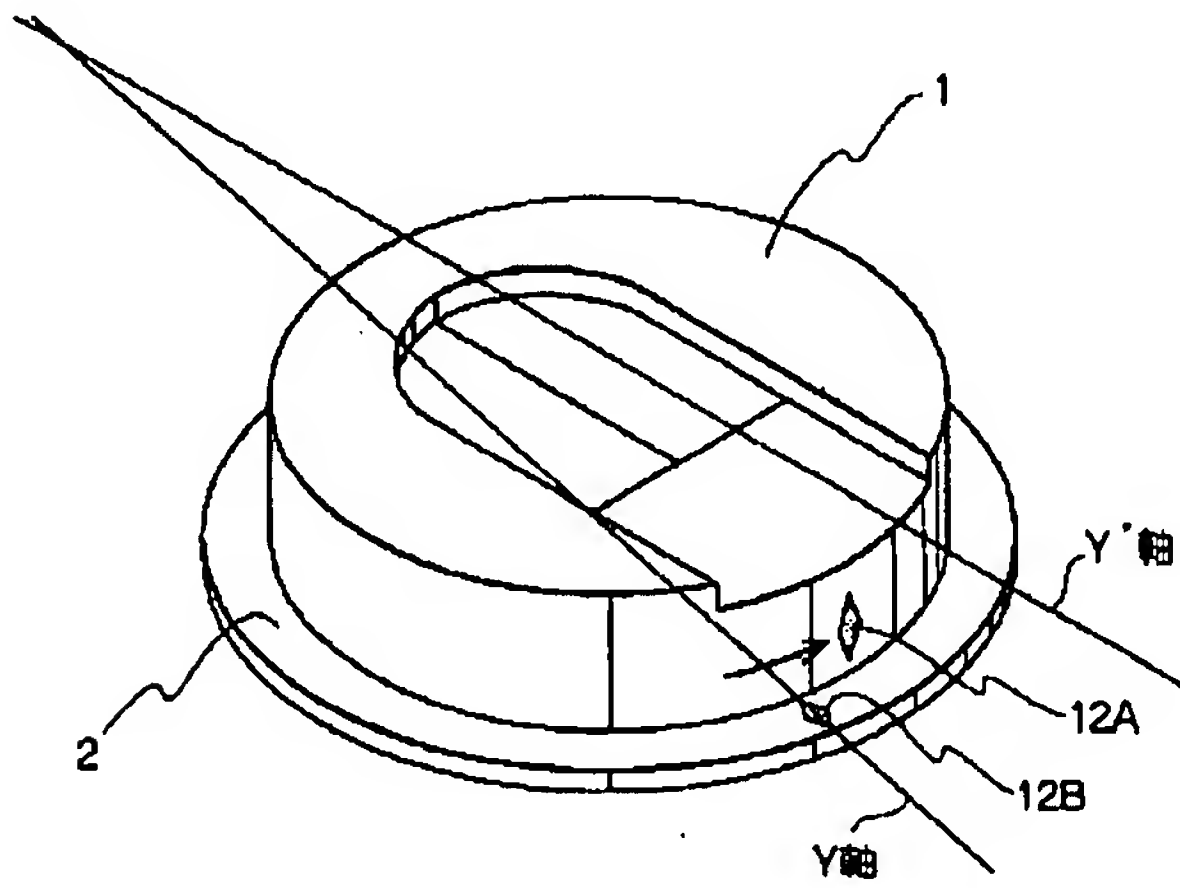
[Drawing 5]



[Drawing 6]



[Drawing 7]



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[Translation done.]